



# Digital Finance Development and Corporate Innovation Vitality

## Moderating Effect of Senior Executives' Overseas Background

Shangqing Yang\*, Dongfang Qiu

College of Economics and Management, Nanjing University of Aeronautics and Astronautics,  
Nanjing, 210016, China

\*yangshangqing@nuaa.edu.cn

**Abstract.** The ease of enterprise financing made possible by the development of digital finance can partially address the issue of "difficult and expensive financing" for enterprises and offer a fresh approach to meeting the funding needs of R&D innovation and stimulating the innovation vitality of enterprises. Based on the data of GEM-listed companies in 2017-2021, this paper uses the time and industry two-way fixed effect model to empirically examine the relationship between digital finance development and corporate innovation vitality, and it analyses the moderating effect of senior executives' overseas background on that relationship. Combined with literature research and empirical analysis, the study concludes that the development of digital finance significantly contributes to stimulating the innovation vitality of enterprises, and the overseas background of senior executives plays a positive moderating role in the relationship between digital finance development and corporate innovation vitality. On the basis of the aforementioned empirical research, recommendations are provided for how to support the steady development of digital finance and promote the all-round development of enterprises at the government and enterprise levels.

**Keywords:** Digital finance, management, innovation vitality, overseas background of senior executives.

## 1 Introduction

The state of the global economy is grim, and China's economic and social development has also entered a crucial period of economic transformation. Since innovation is the primary force promoting economic development, how to swiftly increase China's capacity and level of innovation has become a hot issue for social debate at present. Innovation frequently requires a large amount of cash investment on the part of enterprises, and the limited funds of enterprises are often difficult to support the high cost of R&D innovation investment. China's enterprises, particularly small and medium-sized ones, have long had to deal with financing constraints like "difficult and expensive financing," which severely dampens the enthusiasm of enterprises to en-

gage in innovative activities and stifles their vitality for innovation. In recent years, digital finance, which is highly compatible with the digital economy, has emerged along with the development of digital technology. This development has opened up new possibilities for corporate innovation and, to some extent, it can alleviate the problems of difficult and expensive financing faced by enterprises in the traditional financial environment.

Regarding digital finance, Ozili claimed that digital finance enabled individuals and companies to utilize the Internet to complete a range of online financial services through payment systems<sup>1</sup>. China is presently leading the globe in the development of digital finance, which experts say started in 2013 with the debut of Yu Ebao. The relationship between digital finance and corporate innovation has been hotly debated in the academic community. The findings of numerous literatures imply that digital finance has a driving effect on corporate innovation. Jagtiani and Lemieux investigated the role of digital finance in enhancing the efficiency of corporate finance<sup>2</sup>. Li discovered that digital inclusive finance has a positive role in promoting corporate innovation and that financial mismatch mediates the relationship between the two<sup>3</sup>. On the basis of confirming the influence of digital finance on innovation, Jiang experimentally analyses the mediating effect of government subsidies and the moderating effect of financial constraints, the percentage of shares held by the first largest shareholder, and the asset-liabilities ratio<sup>4</sup>.

Some researchers have confirmed that the development of digital finance is conducive to corporate innovation activities, but there is still a lack of a complete system in this area of study. Based on studying the relationship between the development of digital finance and the innovation vitality of enterprises, this paper continues to analyze whether the overseas background of senior executives can have a moderating influence using data of listed companies in the Growth Enterprise Market (GEM).

## **2 Theoretical Analysis and Research Hypothesis**

### **2.1 Digital Finance Development and Corporate Innovation Vitality**

Without financial backing, enterprises are unable to carry out innovative activities, and the limited funds at their disposal are sometimes insufficient to cover the costs of R&D activities. As a result, enterprises frequently need to raise money in the financial market to support innovation. By relying on contemporary information technology, digital finance partially overcomes the limitations of time and space and effectively reduces the cost of information acquisition, information transmission, labor, and other transaction costs in the financing process. It improves the efficiency of financing, and assists businesses in overcoming funding challenges and obtaining R&D funds, thereby fostering vitality of innovation. The secrecy surrounding enterprise R&D innovation sometimes causes information asymmetry between enterprises and external investors<sup>5</sup>, which prevents enterprises from receiving external investor finance. Existing research demonstrates that enterprises typically experience financial constraints while engaging in innovative activities. With its key characteristics of universality and digitization, digital finance makes effective use of Internet technology to assist external

investors in quickly and accurately obtaining financial and non-financial information about enterprises, assessing those enterprises' solvency, profitability, capacity, and other abilities. It greatly alleviates the informational dilemma between enterprises and external investors, thereby helping external investors to make correct and effective investment decisions and aiding enterprises in obtaining financial support. The inclusive nature of digital finance makes the convenience it offers to benefit many long-tail customers, helping an increasing number of small and medium enterprises to relieve financial constraints, increase the willingness to innovate and stimulate innovation vitality. Thus, we predict:

H1: Digital finance development has a catalytic effect on stimulating corporate innovation vitality.

## **2.2 The Moderating Effect of Executives' Overseas Backgrounds on the Relationship between Digital Finance Development and Corporate Innovation Vitality**

According to the high-order echelon theory, different executive traits will have different effects on financial decisions<sup>6</sup>. Executives with an overseas background tend to be more innovative and risk-takers. They are better equipped to concentrate on cutting-edge technology and make quick judgments. Funds will be invested in R&D activities, thus boosting innovation in the enterprise. When studying or working abroad, executives also tend to amass a certain amount of social and human capital as well as additional high-quality resources<sup>7</sup>. As a conclusion to the previous points, senior executives with overseas backgrounds may pay more keen attention to the booming development of digital finance. Thus, they may take advantage of the convenience that this development has brought about to raise more money for the enterprise to invest in innovation-related endeavours, and more successfully stimulate corporate innovation vitality. Thus, we predict:

H2: The overseas background of senior executives plays a positive moderating role in the relationship between digital finance development and corporate innovation vitality.

## **3 Research Design**

### **3.1 Sample Selection and Data Source**

GEM-listed companies from 2017-2021 are selected as the research sample, and the data used are from the CSMAR database and Peking University Digital Finance Research Centre. The initial sample data are screened based on the original sample: financial listed companies, ST and ST\* companies, companies with abnormal data, and seriously missing financial data are excluded, and continuous variables are subjected to a two-sided 1% shrinkage. Finally, we obtained a total of 4082 unbalanced panel data observations.

### 3.2 Variable Definition

Table 1 displays the study's variables and definitions.

**Table 1.** Variable definitions.

Type	Name	Symbol	Definition
Dependent variable	Corporate innovation vitality	Innovation	The ratio of R&D expenditures to operating revenue
Independent variable	Digital finance development level induction	DIFI	Peking University Digital Inclusive Finance Index normalization
Moderator variable	Overseas background of senior executives	Oversea	The ratio of the number of executives with an overseas background to the total number of the executive team
	Firm size	Size	Natural logarithm of total assets at the end of the period
	Firm age	Age	The natural logarithm of the year of observation minus the year of establishment
Control variables	Growth capacity	Growth	Operating revenue growth rate
	Shareholding concentration	Share	The ratio of the number of shares held by the largest shareholder to the total number of shares
	Board independence	Indep	The ratio of the number of independent directors to the total number of directors
	Government subsidy	Subsidy	Natural logarithm of total government grants for the year

### 3.3 Model Design

#### Benchmark Regression Model.

In this paper, we constructed the benchmark regression model to support the link between digital finance development and corporate innovation vitality.

$$Innovation_{i,t} = \alpha_0 + \alpha_1 DIFI_{j,t} + \alpha_2 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (1)$$

Considering the impact of time and industry characteristics on corporate innovation vitality, a two-way fixed-effects model is used to fix the year and industry effects, so as to eliminate the influence of unobservable factors on the results. The variable subscripts  $i$ ,  $j$ , and  $t$  stand for company, province, and year.  $Innovation_{i,t}$  is the innovation vigor of the enterprise.  $DIFI_{j,t}$  represents the level of digital finance development in the province where the enterprise is located.  $Control_{i,t}$  contains all the control variable indicators.

### Moderating Effect Model.

To verify the moderating role of senior executives' overseas background in the relationship between digital finance development and corporate innovation vitality, we construct the moderating effect model.

$$\begin{aligned} Innovation_{i,t} = & \beta_0 + \beta_1 DIFI_{j,t} + \beta_2 Oversea_{i,t} + \beta_3 DIFI_{j,t} \times Oversea_{i,t} \\ & + \beta_4 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (2)$$

*Overseai,t* refers to the moderating variable Executive Overseas Background and the other variables have the same meaning as in (1).

## 4 Empirical Analysis

### 4.1 Analysis of Empirical Results

#### Analysis of Empirical Results on the Impact of Digital Finance Development on Corporate Innovation Vitality.

The results of using (1) to examine the effect of digital finance development on corporate innovation vitality are provided in Table 2. After regression according to the benchmark regression model, it can be seen that using the correlation coefficient of digital finance development is positive and significant at the 1% level. It indicates that digital finance development significantly contributes to boosting the innovation vitality of enterprises. On the one hand, the digital features of digital finance itself make it convenient for enterprise financing. The addition of information technology will make the investment and financing transactions between investors and enterprises more convenient, enabling enterprises to raise more funds by using digital finance. After resolving the dilemma of restricted funding for enterprises, enterprises typically focus on increasing the level of corporate innovation to strengthen their core competitiveness. This will motivate enterprises to increase their R&D spending, thereby stimulating their innovative vitality. On the other hand, because of its relative universality, digital finance can benefit most groups that were previously unaffected by the traditional financial model. The information asymmetry between investors and financiers will be somewhat lessened in the digital finance system. When performing investing and financing activities, both parties will lower transaction costs due to the Internet. This will somewhat lessen the financial requirements for enterprises to carry out innovative activities. With more financial support, they are more inclined to conduct R&D innovation. Thus, Hypothesis 1 is confirmed.

**Table 2.** Benchmark regression results.

	Innovation			
	(1)	(2)	(3)	(4)
DIFI	0.019*** (4.69)	0.027*** (4.42)	0.016*** (3.93)	0.024*** (3.89)
Controls	NO	NO	YES	YES
Constant	0.062*** (26.35)	0.022** (2.43)	0.216*** (8.79)	0.117*** (4.70)

	Innovation			
	(1)	(2)	(3)	(4)
Industry	NO	YES	NO	YES
Year	NO	YES	NO	YES
N	4,082	4,082	4,082	4,082
R-squared	0.005	0.194	0.064	0.223

### Analysis of Empirical Results on the Moderating Effect of Senior Executives' Overseas Backgrounds.

We examine the moderating effect of senior executives' overseas background using (2). The regression results are presented in Table 3. There is a positive correlation between the executives' overseas background and corporate innovation vitality, and it is significant at the 1% level. Moreover, the correlation coefficient of the interaction term between digital finance development and executives' overseas background is significantly positive at the level of 10%. These results demonstrate that owning executives with overseas backgrounds not only supports enterprise innovation but also plays a positive moderating role in the positive correlation between digital finance development and corporate innovation vitality. Senior executive who work or study abroad will, on the one hand, be influenced by the various environments, according to the analysis of the research hypothesis. They may cultivate a sense of innovation and exploration while also developing distinctive personality characteristics and values that set them apart from local executives. This makes them more inclined to use their funds for corporate innovation. On the other hand, executives may benefit from their overseas experience by gathering human resources and establishing close connections with international financial institutions, research and development organizations, etc. Their distinct advantage is this. They can make use of this to quickly grasp the dynamics of technological growth and financial system developments. Thus, they can provide enterprises with greater capital in the context of booming digital finance. Additionally, enterprises will be more willing to carry out innovative projects and boost innovation vitality. Thus, Hypothesis 2 is confirmed.

**Table 3.** Moderating effect regression results.

	Innovation	
	(1)	(2)
DIFI	0.020*** (3.22)	0.020*** (3.31)
Oversea	0.041*** (6.03)	0.041*** (6.03)
DIFI*Oversea		0.064* (1.91)
Controls	YES	YES
Constant	0.130*** (5.21)	0.129*** (5.18)
Industry	YES	YES
Year	YES	YES
N	4,082	4,082
R-squared	0.230	0.231

## 4.2 Robustness Tests

We utilize the following two ways to conduct the robustness test: the first is to lag the independent variables by one period; the second is to replace the dependent variable measure, i.e., the ratio of R&D expenditures to total assets is used to represent the innovation vitality. The results of the robustness test indicate that the regression results are robust. Due to space constraints, the robustness test results are not shown in the paper.

## 5 Conclusion

Taking 2017-2021 GEM-listed companies as the research sample, we construct a time and industry two-way fixed effect model to test the relationship between digital finance development and corporate innovation vitality. Then, we introduce senior executives' overseas background as a moderating variable to test the moderating role in the relationship between digital finance development and corporate innovation vitality. The study draws the following conclusions: The development of digital finance has a catalytic contributing effect on stimulating corporate innovation vitality; the overseas background of senior executives plays a positive moderating role in the relationship between the development of digital finance and corporate innovation vitality.

We offer recommendations for the government and enterprises, based on the aforementioned conclusions: China should strongly promote the steady development of digital finance to support enterprises' R&D and innovation. At the same time, it should effectively prevent and control financial risks to ensure healthy and long-term growth of digital finance. Enterprises should build out their executive teams and attract top-notch overseas talents. They should reasonably utilize digital finance's convenience for funding to improve their capacity for innovation

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